

Big Ox Siouxland LLC 3/28/2019 Site Visit Dave Hensley Notes

Chisum L. Cooke – Wast Management Dolphin Services

Ethan Joy PE, LEED AP – South Sioux City Nebraska via JEO Consulting Group LLC

Jason Osbahr – Big Ox Energy LLC Director of Research & Development - Engineer

Jody Anderson - Big Ox Siouxland Plant Manager

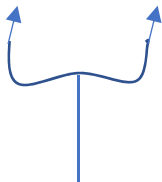
Agenda

Primary topics to be covered

1. BOE to demonstrate / communicate changes which have improved operations to date
2. Update on solid removal
 - a. 4 fields permitted for disposal
3. Bypass Installed

10:00 am in Break Room

- The pipeline is very strict with quality
- Vent Extension in place 3/28/2019 10:40
- Permitted 667 ppm H₂S – at 400 ppm activate treater (H₂S dry media scrubber)
- Water is shot into top of scrubber column and gas bottom into bottom, methane comes out the top and goes to dryer.
- Pipeline will activate slam valve after 15 minutes out of speck time
- They alarm one minute out of speck
- Their sensor is before the pipeline
- O₂ exceedances happen. O₂ from water gets into methane
- Vent valve opened to let out O₂. There is no other way to get it out of the loop.
- Sunday afternoon Saturday morning to open
- Sensors are auto calibrated
- Auto shutoff manual open to pipeline (some one from the pipeline has to come out)
- Pipeline H₂S sensor / valve tricked by H₂
- Pipeline recalibrated with their meter
- H₂ produced can't be pulled into
- Meg Tech is equipment vender
- Car parked at gate
- Bottles of cal gas are by instrument building



- Gas meters calibrated how often?
- CH₄, SO₂, and CO₂ trace is the makeup of vented gas

- Sometimes it is high pressure
- Vented in February
- Last time vented?
- When installed? When O2 began being a problem, don't know date
- Dry media scrubber only used when gas is above 400 ppm H₂S to conserve media

Gas Skid 11:00

- Photo of installed vent extension from west



- Ultramat 23 and 6 Simmons
- Samples ever 6 minutes
- One guy wire attached to fence? Soil was too wet to get good placement
- Guy wires likely temporary, they are working on additional structural support
- Looking at different support options
- Storm water permit
- Took waste off site
- Bermed area prepared
- Holding 2 foot of waste yesterday none now
- Plan to design waste management on site across street, pond, reuse water

- Two fractions Industrial steam and trucked in
- Moving materials truck – US DOT 1139414

Receiving Bay

- Waste loads that poses hazards can direct unload
- pH and temperature are taken from each load
- Have developed an acceptance proforma – how is it supposed to look compared to what it looks like
- Incident – change in load that did not look right, stopped returned, pushing back on out of speck loads, returning the rejected loads to sender
- Methodology changing?
- Agreed to waste only
- What does the beep on the H2S monitor mean? 1 minute confidence beep
- Door open on east side about 2 feet, west side door fully open, pit open
- Receiving pit tank mixing cleaned 6 weeks
- Change from SCBA to isolated pump in
- Mixer issues were 100% caused from material put into digesters
- Manage 100% feed volume
- Feed stock changes management lost, ran all feed stock (“whatever the truckers brought”)

Digester area

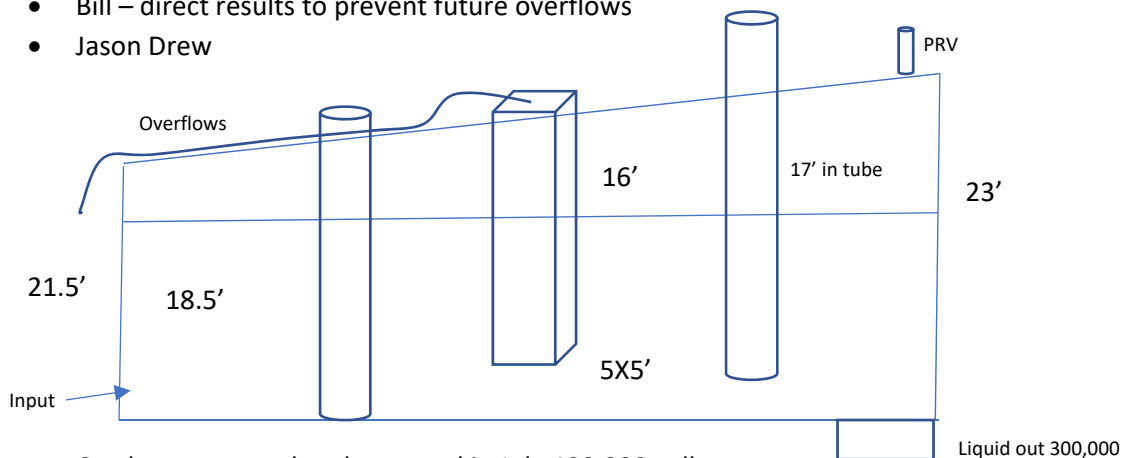
- H2S meters stored in this area.
- Each employee gets a meter H2S, logs into meter with FFID Tag card, Bluetooth tracks meter
- Turn on, acknowledge safety message, before it does a 30 second self test
- Calibrates and downloads data when docked.
- 18 day retention time
- Boilers used for heating
- Need to keep digesters at 85-90°F to create ideal digestion conditions
- Suction sides are open, Why? Air flow maybe
- 4 natural gas boilers
- Dolphin centrifuge management for another week but maybe longer
- Went from two centrifuges to one
- 9 sumps in digester, plug can be used to dump anything at different point of system
- Both BPI force main ins
- Twine does not agree with centrifuges
- 500 micron screen maintains centrifuge system
- One centrifuge running now
- 20/100th screener
- Have flash tanks allow balancing
- 115 gallon per day
- 16,000 GPM to river
- Lift system allows higher capacity

- Inflow H2O sampler = 5800 ISCO SAM703 SAM70260
- 1,000-2,000 lbs to city now.
- One side of GEM running now
- GEM – Clean Water Technology
- Flexible piping and pumping
- Dedicated pumps for running to 300-400 ppm turbidity observed today

Delta Hotel

- Solids removal – pressing issue
- Information that
- High pressure, flare not designed for
- 3 way valve used to vent
- Vent used to avoid impact, should only be used on startup shutdown or pipeline compliance 10 – 15 times a year.
- It has reset to record the #1 position = opens sends an email to management installed last night 3/27/2019. It was a process to install correctly.
- Jason and I will talk about
- Mike M and Bill G on phone
- NDEQ satisfied with modeling and getting the permitting done
- Jason will send an example report out
- Bill – NDEQ how much data is being used? How much modeling needs to be done?
- NDEQ - Anything else coming out needs to be modeled, can't add H2S to from vent to scrubber column, H2S out of vent is different emission point
- Row digester can't come out digester
- Bill – permit based on TRS standard
- Fence line monitoring H2S fence line monitoring a couple of 30 minutes
- Susan and state at level – Jason work with NDEQ from some
- Permit update coming soon
- Solids management – water treatment
- The facility is now operating as designed after changed management structure
- Hired Judy and high quality contractors hired his experience is running treatment systems
- 3 years of data for BPI – predicted operations when operations started slower for Sioux City NE
- 240,000 gallons total max production per day
- Past 400-450,000 gallons some days
- Truck ins account for 150,000 gallons
- Overflow caused by level control more than the foaming
- March 20th continuing to overflow, both 7 days later, both went down
- Not a good condition to be under
- In May installed screw presses
- Wastewater bill is \$1.5 million
- July 4 to 5 centrifuges is back
- Centrifuges were run hard

- Overloading GEM due to receiving soil from removal
- 2/1/2019 Mike & Chisum installed rented centrifuge
- Day 2 300,000 to GEM reduced to 20,000 gallons
- Chisum – sites as digester – Dolphin Services provided equipment but did not install and operate
- Continuous tracking, operations and maintenance is critical
- Costly testing and maintenance
- 1 centrifuge at 150gpm is as good as 3 centrifuges at 50gpm
- Ran 3rd centrifuge for a week allowed maintenance
- Now running with 180gpm TDS 300-600
- Making 4-6 truck loads before is to 15 loads per day now back to 6-7 loads per day
- System is stabilizing
- Bill – direct results to prevent future overflows
- Jason Drew



- Can become a syphon happened in July 400,000 gallons
- 25 square foot area making gas out atmosphere, biocut with fat and fiber
- Liquid safety release valve = hatch
- Stopped contaminants going into the system ★
- HRT Reduced to 18 days minimum
- 7 day feeding to divide feed balance liquid and energy
- Not having to rerun sludge will help or eliminate risk of overflow
- Solids removal prevents overflow
- Long term solution for solids management needed
- Dolphin is leaders and experts in centrifuges
- 1000 decantation per day
- 1200 decantation is capacity
- Profitable last 2 months for the 1st time
- Jody is managing the plant
- 1st 90 days could not control levels
- Now can control plant, looking for options for long term plans for solids management
- Composting maybe
- Mixer 2 is still down
- Is that mixer a critical piece? No Jody the plant can run as is
- Westech modeling with mixer removed

- Jason – not critical in a plug flow digester like this
- Jody – priority for April is fixing gas skid – maintenance from winter
- Response to show cause is coming from Ted or Jason
- Use matrix for priority setting with controls
- Receiving bay? Yes
- SOP – not at facility
- Jason – high hopes for the future of the plant
- 1.5 million gallons of waste not going to landfill and venting flammable gas
- Solids
- Industrial waste – calculations
- Land application in future maybe?
- Soil in aerobic
- 5542 tons on site today but generate and leaving constantly
- Didn't know where Chrome hex 6 came from
- Looking a licensed composting
- Receiving pit not cleaned out in 6-8 months, until Jody came on site
- 30 foot dumpster a day twine and cow parts,
- diaptomus earth not a problem with proper mixing as it goes in.
- SRF loan?
- South Sioux City Iowa sent letter to terminate waste water from Sioux City Nebraska
- Sioux City NE looking at its own water treatment and taking ownership of Big Ox
- Composting capability at new waste water system
- Ownership discussions tomorrow
- Water treatment maybe a partnership